



CLAIMS

What is claimed is:

1 1. A method for measuring the position of an actuator, which has a coil that
2 moves relative to a core of a magnet, comprising the following steps:
3 generating an alternating-current (AC) signal through the coil;
4 sensing current flow through the coil as a coil current signal;
5 generating a control signal as a function of the coil current signal and having a
6 frequency corresponding to a position of the coil relative to the core;
7 generating the AC signal with the same frequency as the control signal; and
8 as a function of the frequency of the control signal, generating an output position
signal indicating the position of the coil.

2. A method as in claim 1, further including the following steps:
 generating a regulator output signal as a function of the difference between an
input position set-point signal and the output position signal; and
 generating the control signal as a function of the difference between the
regulator output signal and the coil current signal.

3. A method as in claim 2, in which the step of generating the control signal
comprises applying hysteresis to the regulator output signal before forming the
3 difference between the regulator output signal and the coil current signal.

1 4. A method as in claim 1, further comprising the following steps:
2 measuring a temperature-induced change of resistivity of the coil;
3 calculating a temperature compensation factor; and
4 adjusting the control signal by the compensation factor.

1 5. A method as in claim 4, in which the step of measuring the temperature-
2 induced change comprises measuring the temperature of the coil.



1 6. A method as in claim 4, in which the following steps:
2 measuring the temperature-induced change comprises measuring an average
3 value of voltage over the coil and an average value of current through the coil; and
4 calculating the compensation factor as a predetermined function of the ratio
5 between the average value of voltage and the average value of current.

1 7. A method for measuring the position of an actuator, which has a coil that
2 moves relative to a core of a magnet, comprising the following steps:
3 controlling a force generated by the actuator by applying a DC driving voltage
4 signal to the coil;
 superimposing a constant-amplitude, sinusoidal voltage signal on the DC driving
voltage signal;
 measuring an alternating current (AC) coil signal through and an AC voltage
signal of the coil;
 measuring a phase shift between the AC coil signal and the AC voltage signal;
and
 calculating a position signal corresponding to a position of the coil relative to the
core as a predetermined function of the phase shift.

 8. A method as in claim 7, further comprising the following steps:
 measuring a temperature-induced change of resistivity of the coil;
3 calculating a temperature compensation factor; and
4 adjusting the control signal by the compensation factor.

1 9. A method as in claim 8, in which the step of measuring the temperature-
2 induced change comprises measuring the temperature of the coil.



1 10. A method as in claim 8, in which the following steps:
2 measuring the temperature-induced change comprises measuring an average
3 value of voltage over the coil and an average value of current through the coil; and
4 calculating the compensation factor as a predetermined function of the ratio
5 between the average value of voltage and the average value of current.

1 11. An arrangement for measuring the position of a voice-coil actuator,
2 comprising:
3 a permanent magnet core;
4 a coil arranged to move relative to the core;
5 an oscillation circuit having, as a first input, an alternating-current (AC) signal
corresponding to an instantaneous current flowing through the coil and having, as an
output, a measurement output signal that has a frequency corresponding to the position
of the coil relative to the core; and
 a converter converting the frequency of the measurement output signal into a
position output signal indicating the corresponding to the position of the coil relative to
the core.

12. An arrangement as in claim 11, further comprising:
means for measuring a temperature-induced change of resistivity of the coil;
means for calculating a temperature compensation factor; and
means for adjusting the control signal by the compensation factor.

1 13. An arrangement as in claim 12, in which:
2 the means for measuring a temperature-induced change comprises means for
3 an average value of voltage over the coil and an average value of current through the
4 coil; and
5 the means for calculating a temperature compensation factor comprises means
6 for calculating the compensation factor as a predetermined function of the ratio
7 between the average value of voltage and the average value of current.

1 14. An arrangement as in claim 11, further comprising:
2 a regulator having, as a first input, a position set-point signal corresponding to a
3 desired position of the coil; as a second input, the position output signal; and, as an
4 output, a position difference signal;
5 a comparator having as a first input, the alternating-current (AC) signal; and, as
6 an output, the measurement output signal;
7 a hysteresis arrangement connected between the output of the regulator and a
8 second input of the comparator; and
9 a switching arrangement applying current of alternating polarity to the coil at a
10 frequency equal to the frequency of the measurement output signal.